Phase II - Objective
Mobile Infrared Scene Projector
(MIRSP)

PM ITTS STOC Industry Conference

7 - 8 August 2001

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Background

- Phase I “Pathfinder” MIRSP - risk reduction prototype
  - First truly mobile IRSP capability
- Developed and integrated by Redstone Technical Test Center (RTTC) under structured program with formal requirements, design reviews, IPTs, CDRLs, acceptance testing, etc.
- Delivered to Aviation Technical Test Center (ATTC) Dec. 2000
- Used to support T&E of Starstreak and scheduled for application to Comanche
- Focus on mobility and integration of existing technology to gather lessons learned and refine requirements
- 7 major subsystems

"Pathfinder" MIRSP Components

Subsystem	Source	Developer
Software Control Subsystem	Custom	RTTC
Computer Image Generator	COTS	SGI (Onyx2)
Control Electronics Subsystem	Modified COTS	CSA
Infrared Emitter Subsystem	GFE from DIRSP	Honeywell
Projection Optics Subsystem	Custom	J anos
Non-Uniformity Correction Subsystem		
Radiometer	COTS	FLIR Systems Inc.
Interface	Custom	RTTC
Frame Grabber	COTS	Imaging Technologies
Mounting Platform Subsystem	COTS	Aerotek & Wells Cargo

“Pathfinder” MIRSP

“Pathfinder” MIRSP

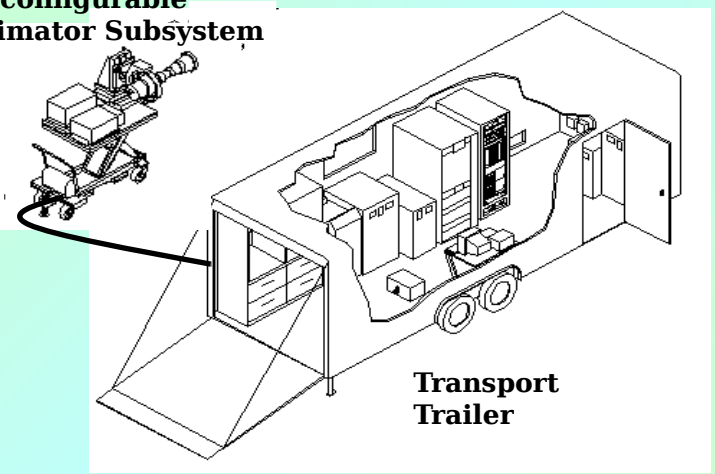
Pathfinder Vs Objective Capabilities

		Pathfinder	Objective
Core Requirements	2-man positioning		
	Project up to 5 minutes of NUCed "canned" imagery at 60 Hz		
	Accommodate RS-170		
	Digital input for real-time scene generation		
	Optically interface to platform		
	Optically interface to UUT		
	Closed-loop capable		
	Optics fill entire sensor field of view (FOV)		
	Dynamic imagery fill entire sensor FOV	N/A	
	Stand-Off-Distance (SOD) greater than 20"		
	Attach to ground system turret	N/A	
	Operate in a "controlled" environment (-46C to +52C)	N/A	
	Simulate operational environments (-46C to +52C)		
	Operate off 30 kW generator (20 kW desired)		
	Self contained cooling system		
	Core requirements for LWIR sensors		
	Core requirements for MWIR sensors	N/A	
	Core requirements for common aperture MWIR/LWIR sensors	N/A	
	Core requirements for ultraviolet sensors	N/A	
	Core requirements for visible sensors	N/A	
	Core requirements for image intensifier (I2) sensors	N/A	
	Accommodate classical EO tests (non-dynamic)	N/A	

DOES/WILL MEET

MIGHT NOT MEET

Objective MIRSP



CUSTOMER/ USERS

- **Customers -**
  - Aviation Technical Test Center (ATTC)
  - Redstone Technical Test Center (RTTC)
- **Users -**
  - COMANCHE (RAH-66)
  - LONGBOW APACHE
  - KIOWA WARRIOR-ARMED
  - SOF MK-60
  - IBAS
  - FUTURE COMBAT SYSTEMS
  - JAVELIN MISSILE SYSTEM
  - Common Missile
  - M1A2 SEP
  - LRAS3
  - LOSAT
  - ITAS
  - Avenger
  - TOW Fire & Forget
  - UGV
  - UAV

DESCRIPTION

MIRSP will provide simulation and test capabilities for evaluating/testing EO/IR sensors and subsystems *while installed on the weapons platform.* It will be used to support EO sensor integration & testing during sensor/subsystem development, fielding and P3I upgrades

FUNCTIONAL DATA

- Supports installed EO system/subsystem testing (RSTA Sensors, Navigation Sensors, Laser Rangefinders/Designators, Missile Warning Sensors, Imaging Intensifier Sensors, Missile Seekers, Laser Warning Receivers, Trackers, etc.)
- Mobile/transportable and reconfigurable/modular
- Spectral Band: 0.35-14.0 um (minimum)
- Frame Rates: 30-180 hertz
- Project dynamic operational scenarios as well as static target sources

Requirements

"Objective" MIRSP will…

- Provide a transportable/mobile capability to simulate, test and evaluate electro-optical (EO) sensors for ground and aircraft platforms
  - Imaging IR Sensors
  - Imaging Visible Sensors
  - Non-Imaging EO Sensors
  - Laser Rangefinders
  - Laser Designators
  - Laser Warning Receivers
  - Image Intensifier Sensors
  - Missile Warning Sensors
- Project accurate, dynamic, and realistic in-band EO scene imagery to the subsystem/system under test
- Provide accurate, reconfigurable and calibrated EO sources for classical EO parametric tests/techniques used in typical logistics support automated test equipment
- Fully assess all the EO sensors/subsystems on an integrated weapons platform

Requirements (cont'd)

"Objective" MIRSP Requirements:

- Growth capability to incorporate GFE large format resistor arrays (1024x1024 and 1024x2048) from IRSS P3I CTEIP
- Potential GFI/GFP items may result from IRSS P3I CTEIP
- Desirable to leverage DIRSP/"Pathfinder" MIRSP underlying technology
- Desirable to use COTS components
- Contractor Logistics Support (CLS) is envisioned as a follow-on contract option

- Critical technical and operational goals are still being defined
- MIRSP IPT will update ORD with "Objective" MIRSP - 1Q02

Challenges

- Availability of large IR emitter arrays
  (1024x1024 & larger - FY04-05 timeframe)
- Increased bandwidth of image data path for dynamic scenarios
  (faster frame rates, larger images)
- Cost of critical items
  (IR arrays, drive electronics, scene generator)
- Identify requirements for closed-loop interaction with UUT platforms

Technology Vendors

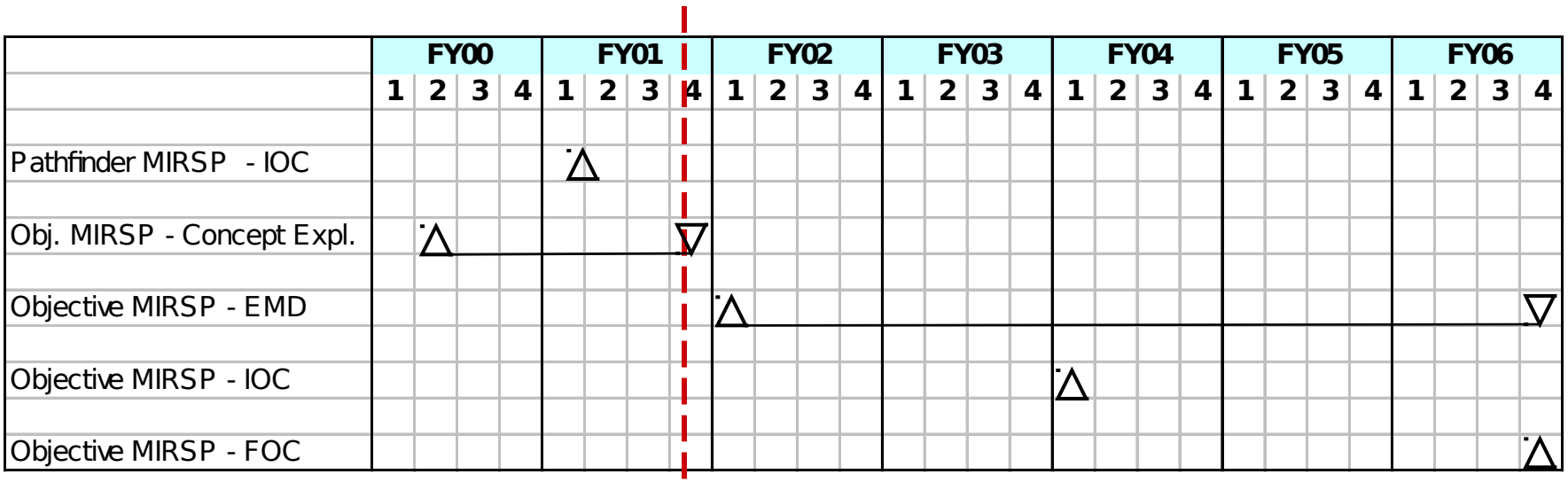
- Aegis
- British Aerospace (BAe)
- Computer Science and Applications, Inc. (CSA)
- Diversified Optics (DIOP)
- Indigo Systems
- Janos Technology, Inc.
- Mantech
- Mission Research Corporation (MRC)
- Northrup Grumman Amherst Systems
- Optical Science Corp.
- PEI, Inc.
- Photon Research Associates
- Santa Barbara Infrared (SBIR)
- SPARTA

Acquisition/Contracting

Strategy

- Combination
  - In-house development
  - Competitive awards
- Potential Associate Contractor Agreement (ACA) required
- Expect to merge requirements with IRSS P3I CTEIP project to leverage development efforts
- Leverage existing Government logistics support Automated Test Equipment (ATE) to minimize non-recurring costs (CASS, IFTE, TETS)
- Development: FY 01-06 (extended to FY06 to accommodate large format arrays developed through the CTEIP effort)

Objective MIRSP
Program Schedule/Funding


FY00
FY01
FY02
FY03
FY04
FY05
FY06
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
Pathfinder MIRSP - IOC
Obj. MIRSP - Concept Expl.
Objective MIRSP - EMD
Objective MIRSP - IOC
Objective MIRSP - FOC

Dollars in Thousands	2000	2001	2002	2003	2004	2005	2006	Complete
TOTAL Required	$	$$	$$	$$	$$	$$	$$	$$$
RDTE Funded Phase II	$	$$	$$	0	0	0	0	
Total Unfunded	0	0	$$	$$	$$	$$	$$	
Quantities	0	0	0	0	0	0	2	2

Summary

The Objective MIRSP system will...

- Test EO sensors while installed on the weapon systems platform
- Provide complete, accurate & timely test data for improved decision making capability & confidence
- Leverage evolving resistive array, computer and other innovative technologies
- Apply lessons learned from DIRSP, pathfinder MIRSP and other IRSP development projects
- Provide the T&E community with technologies and instrumentation to accurately test and evaluate current and future weapon systems with reconfigurable, reprogrammable EO test instrumentation

Back-up

Acronyms

ATE	Automated Test Equipment
ATTC	Aviation Technical Test Center
CASS	Consolidate Automated Support System
COTS	Commercial of the Shelf
CSA	Computer Science and Applications
CTEIP	Central Test & Evaluation Investment Program
DIRSP	Dynamic Infrared Scene Projector
EO	Electro-Optical
FLIR	Forward Looking Infrared
GFE	Government Furnished Equipment
IFTE	Integrated Family of Test Equipment
IR	Infrared
IRSS	Infrared Sensor Stimulator
MIRSP	Mobile Infrared Scene Projector
NUC	Non-Uniformity Correction
P3I	Pre-Planned Product Improvement
RTTC	Redstone Technical Test Center
SGI	Silicon Graphics, Inc.
STOC	STRICOM Omnibus Contract
TETS	Third Echelon Test Set
UUT	Unit Under Test

IRSS P3I CTEIP PROJECT DEVELOPMENTS

- Developing larger format (1024x1024, 1024x2048) IR micro-resistive emitter arrays (LFRAs) (FY01-04)
  - Full FOV image projection for new generation square format FPA MWS, CMWS, FLIRs & other advanced IR imaging sensors (ACETEF, ECIT, ATEC)
    (MIRSP will leverage off None Recurring Engineering (NRE) for first article 1024x1024 array)

- F-FOV ultraviolet (UV) image projection for MLD, CMWS & MWS (FY03)
- F-FOV visible image projection for CCD TV sensors (FY03)
- F-FOV dual-band (MWIR/LWIR) image projection (FY04)
  - Simultaneous and co-axial full FOV MWIR/LWIR image projection for FSCS/TRACER and Future Combat System (FCS) sensors
- Associated high performance scene rendering improvements (FY04)

DIRSP

DYNAMIC INFRARED SCENE PROJECTOR

CUSTOMER / USERS

Customer - Redstone Technical Test Center (RTTC)

Users -

- **COMANCHE (RAH-66), APACHE -LONGBOW**
- **ITAS, IBAS, JAVELIN, AVENGER, TOW- FIRE & FORGET, UGV**
- **Future Combat Systems**
- **Horizontal technology integration 2ND GEN FLIR Platforms: M2/M3-A3 IBAS, LRAS3, LOSAT**

DESCRIPTION

- **Provides enhanced modeling, simulation, and test capability for evaluating Electro-Optic (EO) sensors and InfraRed (IR) imaging subsystems.**
- **Enables projection of *accurate, dynamic*, and *realistic* IR scenes into the entrance aperture of the sensor/subsystem under test.**
- **Provides *repeatable, controlled, complex, real time* scenarios with *multiple targets, clutter* and *countermeasures*, while exposed to extreme temperature environments across the system's operational envelope.**
- **Provides assessment in *reconnaissance, surveillance, and target acquisition, for testing, training, and doctrine evaluation;* to include aided or automatic target queuing, tracking and ATR performance.**
- **Sensors are tested in a closed-loop simulation at the subsystem level and in various system operational environmental conditions.**

FUNCTIONAL DATA

- **Spectral Band: Long Wave Infrared (LWIR) 8-12 un**
- **Frame Rate: 30 hertz**
- **IOC and Final Acceptance Testing at RTTC: 4Q FY0**